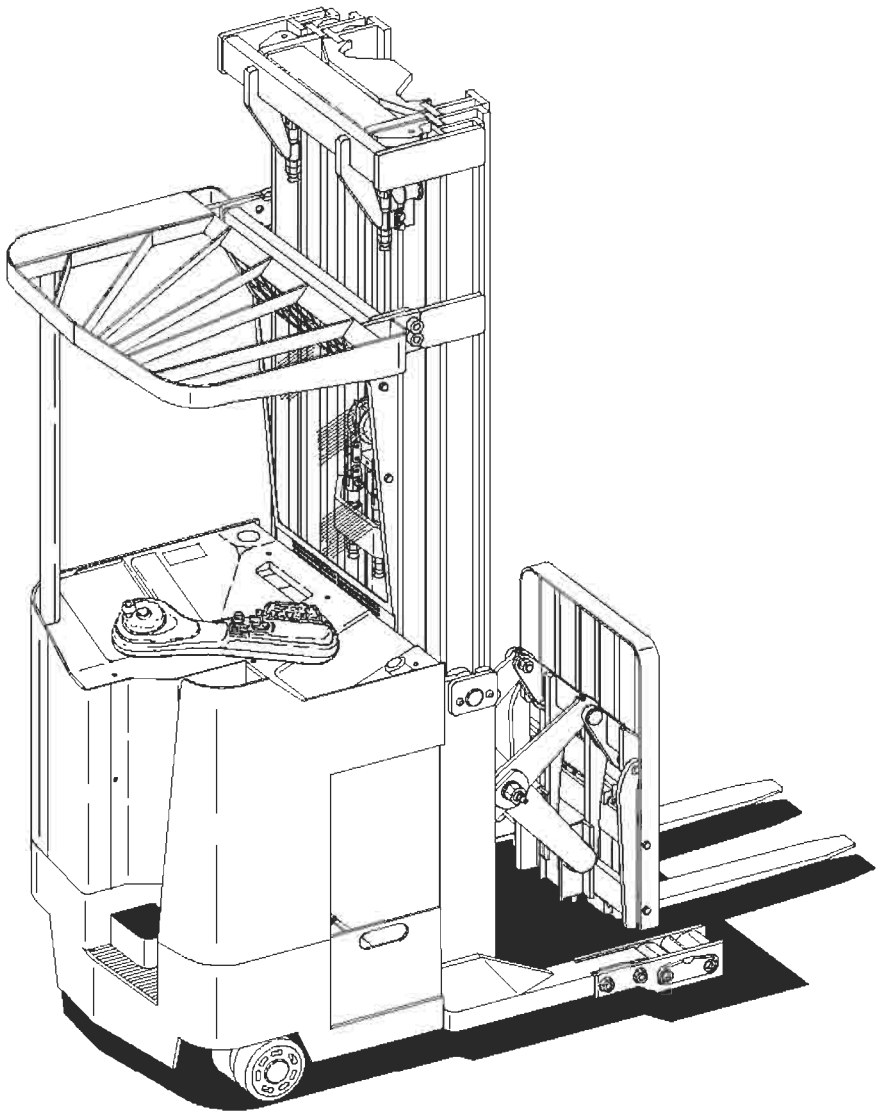
Kalmar AC

Master Service Manual
Book #TM5749-2

NR35B/45B, ND30B, NS40B/50B

Electric Stand-Up Rider Truck
Effective Serial Number 27163001 and Up



⚠ **WARNING**	Read and observe all warnings on this unit before operating it.
⚠ **WARNING**	**DO NOT** operate this equipment unless all factory installed guards and shields are properly secured in place.

Date: February 07, 2002

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Standard Codes

B-Code = Business area

F-Code = Product family

T-Code = Product type

C-Code = Component function

Worksheet standard

W-Code = Working code

R-Code = Reason code

SO-Code = Assortment

F-Code List

PS - Powered Pallet Stacker

T-Code List

Code	Model
395	NR35B
396	NR45B
397	ND30B
398	NS40B
399	NS50B

C-Code List

No	Function Group	C-Code
0	Chassis	0000
1	Motors	1000
2	Drive Gear / Transmission	2000
3	Brake / Wheel System	3000
4	Steering System	4000
5	Electrical System	5000

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Standard Codes

Version no T-code
000

6	Hydraulic / Pneumatic System	6000
7	Operating Function-lifting Mast / Cylinders	7000
8	Peripheral / Installation Equipment	8000
9	Options / Attachments	9000

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Warning Symbols

Always follow the warnings given in this Service Manual and on the truck to avoid accidents and incidents from occurring.

1. Warning Levels

Warning levels

Warning texts are given in four levels and provide information on the risks, describe the consequences, and instruct how to avoid accidents.

DANGER

Warns that an accident will occur if the instructions are not followed.
The consequences are serious personal injury or possibly death, and/or extremely large material damage.

WARNING

Warns that an accident can occur if the instructions are not followed.
The consequences are serious personal injury or possibly death, and/or large material damage.

CAUTION

Warns that an accident can occur if the instructions are not followed.
The consequences are personal injury and/or material damage.

NOTE!

Marks the risk of an accident or breakdown if the instructions are not followed.

Prohibitory Symbols

NO SMOKING

If smoking occurs in situations where a restriction against smoking is stated, a serious accident can occur.

OPEN FLAMES PROHIBITED

If open flames are used in situations where open flames are prohibited, a serious accident can occur.

GENERAL PROHIBITION

If the prohibition is ignored, a serious accident can occur.

1. Ordinance Symbols

SAFETY SHOES

When the directive for safety shoes is given, safety shoes shall always be worn to avoid personal injury.

PROTECTIVE GLASSES

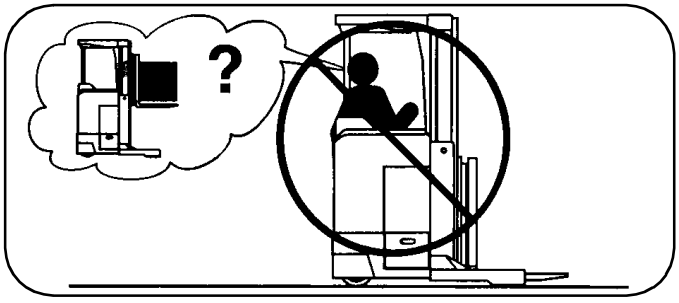
When the directive for protective glasses is given, protective glasses shall always be worn to avoid personal injury.

Safety

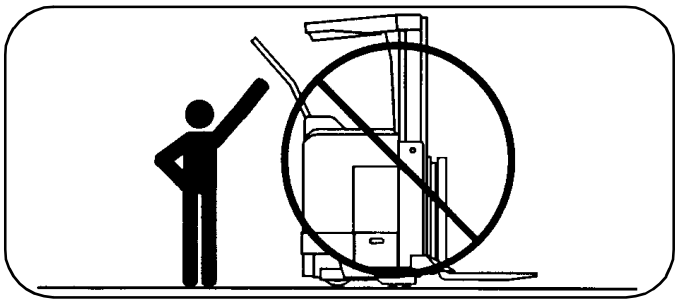
1. General Safety

Do NOT operate or work on this truck unless trained, qualified, and authorized to do so and have read the Operator's Manual.

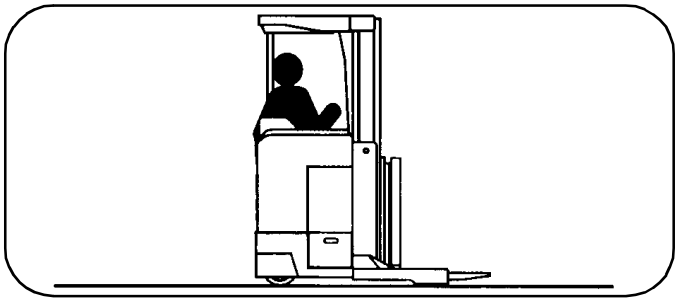
Know the controls on the truck and what they do.



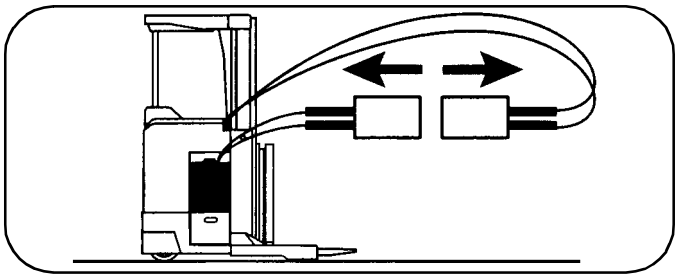
Do **NOT** operate truck if it needs repair or if it is in any way unsafe.



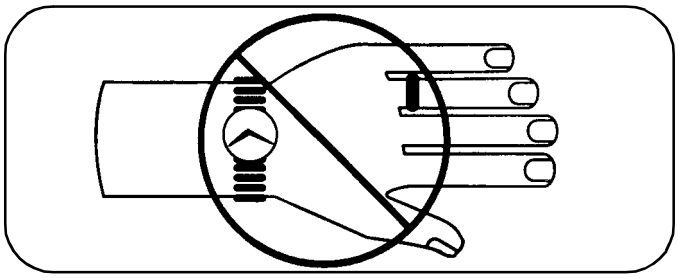
Operate truck only from the position of the Operator.



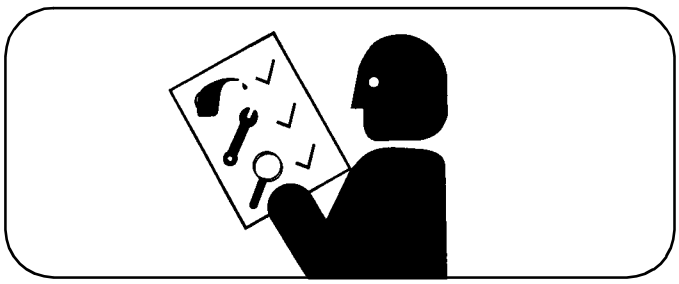
Before working on this truck always turn key switch to **OFF** and disconnect battery connector on truck (unless this manual states otherwise).



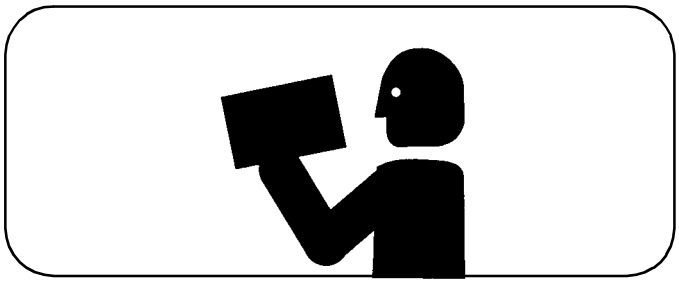
Do **NOT** wear watches, rings, or jewelry when working on truck.



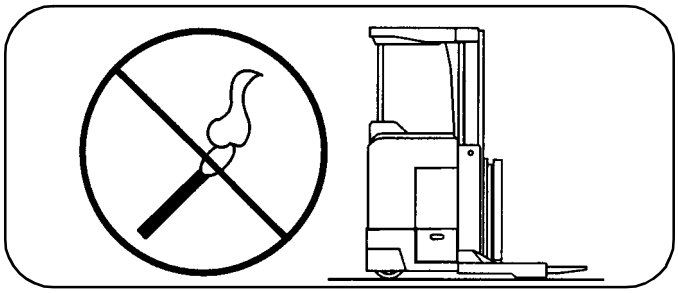
Follow the scheduled lubrication, maintenance, and inspection steps.



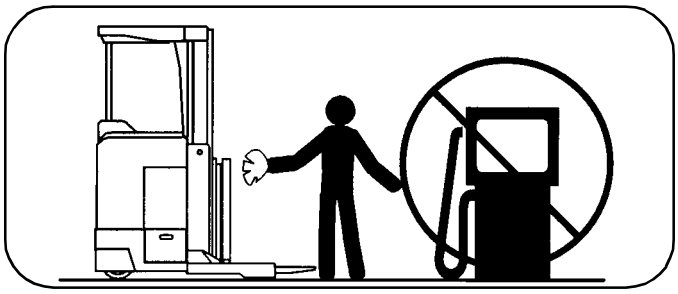
Follow exactly the safety and repair instructions in this manual. Do **NOT** take “shortcuts”.



Do **NOT** Use an open flame near the truck.

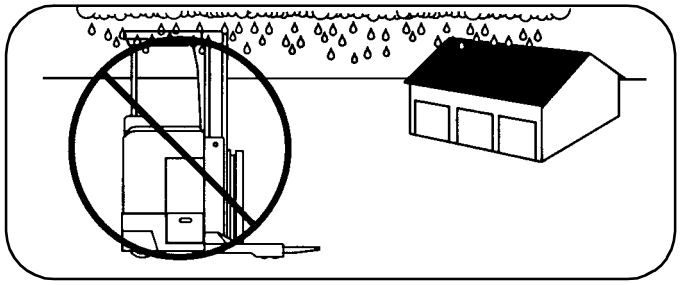


Do **NOT** use gasoline or other flammable liquids for cleaning parts.

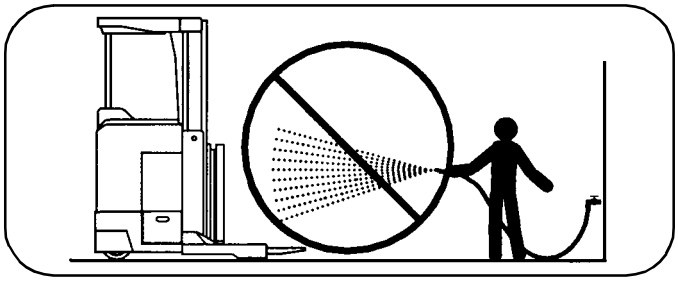


Clean up any hydraulic fluid, oil, or grease that has leaked or spilled on the floor.

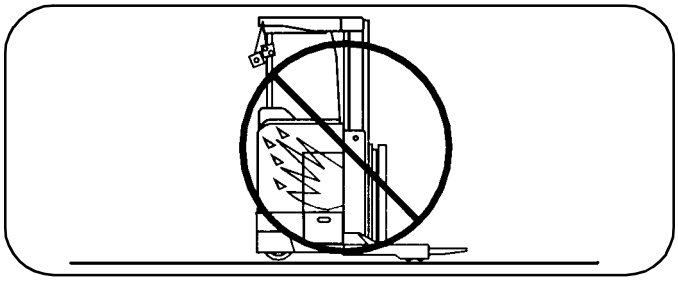
Always operate and park truck indoors.



Do **NOT** wash truck with a hose.



Do **NOT** add to or modify truck without written approval from **Kalmar AC., Inc.**

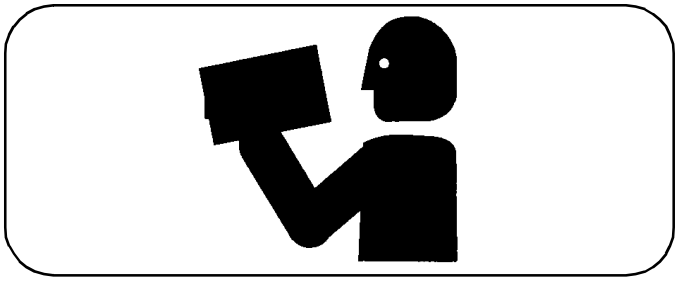


Battery Safety

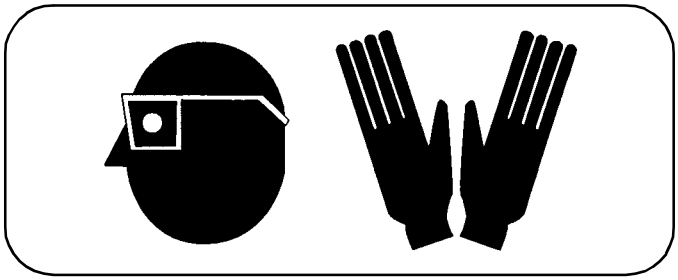
⚠ WARNING As a battery is being charged, an explosive gas mixture forms within and around each cell. If the area is not properly ventilated, this explosive gas can remain in or around the battery for several hours after charging. Be sure there are no open flames or sparks in the charging area. An open flame or spark can ignite this gas, resulting in serious damage or injury.

⚠ WARNING Battery electrolyte is a solution of sulfuric acid and water. Battery acid causes burns. Should any electrolyte come in contact with clothing or skin, flush the area immediately with cold water. Should the solution get on the face or in the eyes, flush the area with cold water and receive medical attention immediately.

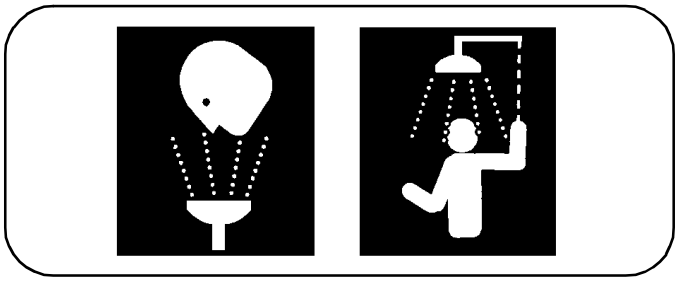
Read, understand and follow procedures, recommendations and specifications in the battery and battery charger manuals from the manufacturer.



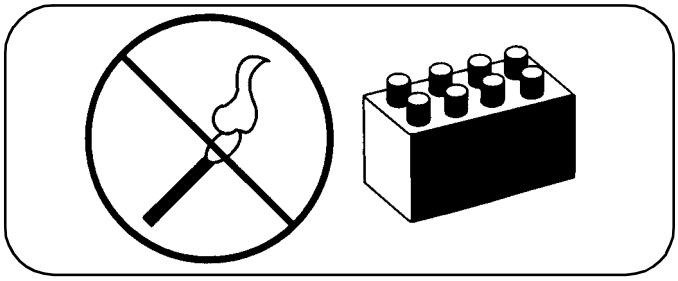
Wear personal protective equipment to protect eyes, face, and skin when checking, handling, or filling batteries. This equipment includes goggles or face shield, rubber gloves (with or without arm shields) and a rubber apron.



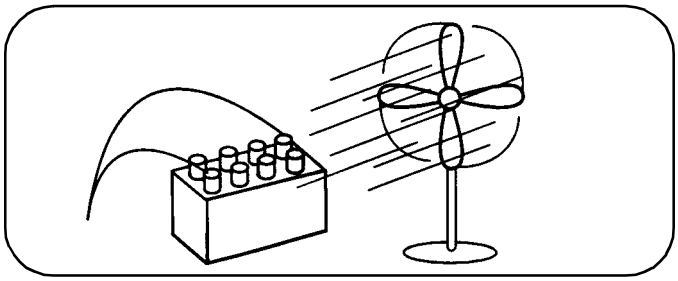
Make sure a shower and eyewash station are nearby in case there is an accident.



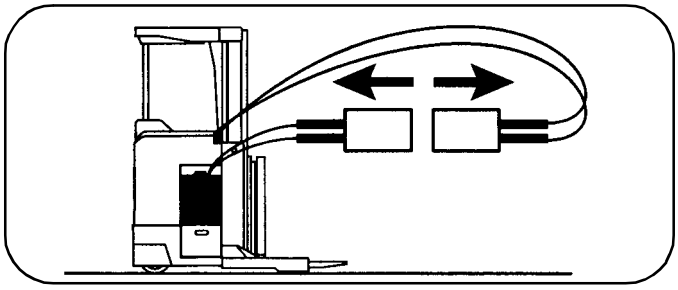
A battery gives off explosive gases. Never smoke, use an open flame, or use anything that gives off sparks near a battery.



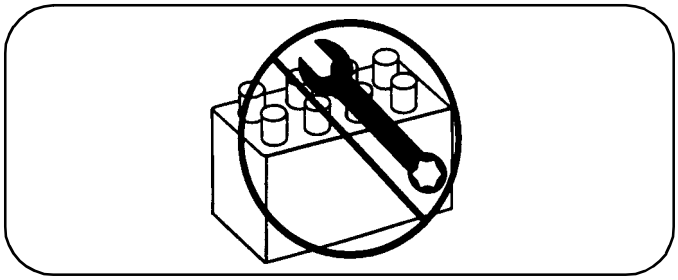
Keep the charger area well-ventilated to avoid hydrogen gas concentration.



Turn the key switch off before disconnecting the battery from the truck at the battery connector. Do **NOT** break live circuits at the battery terminals. A spark often occurs at the point where a live circuit is broken.

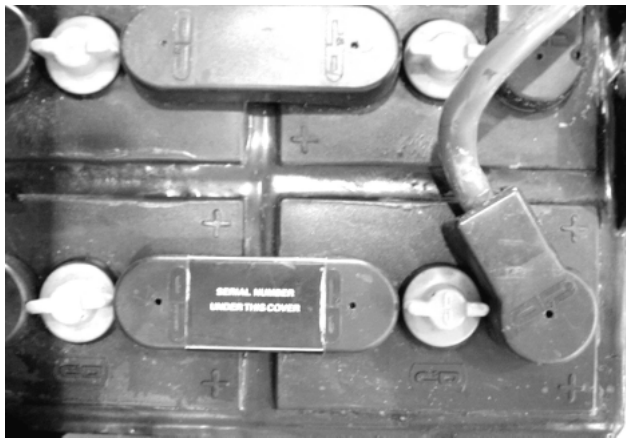


Do **NOT** lay tools or metal objects on top of battery. A short circuit or explosion could result.



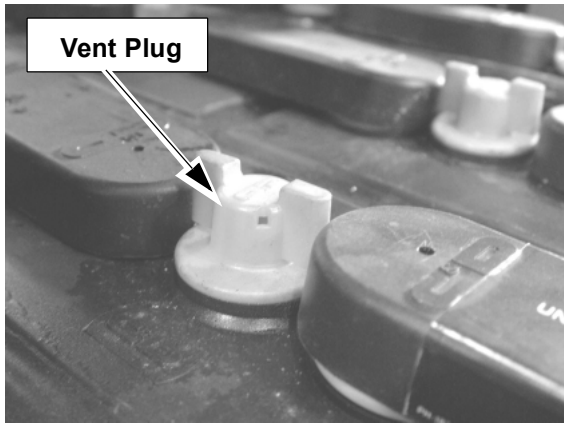
Keep batteries clean. Corrosion causes shorts and possibly sparks to the frame.

Keep plugs, terminals, cables, and receptacles in good condition to avoid shorts and sparks.



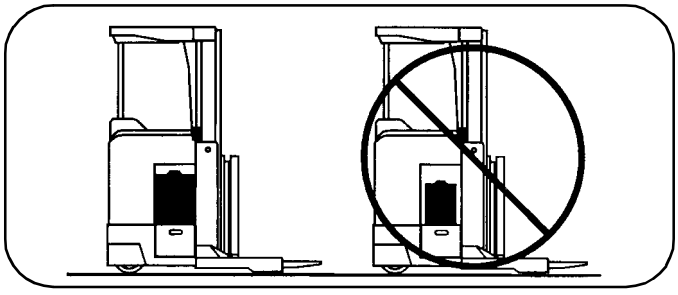
Keep filler plugs firmly in place at all times except when the electrolyte level is checked, when water is added to the cells or when the specific gravity is checked.

Make sure vent holes in filler plugs are open to allow gas to escape from the cells.

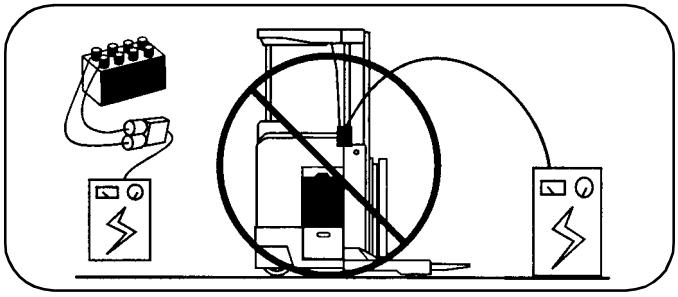


Do **NOT** allow cleaning solution, dirt, or any foreign matter to enter the cell.

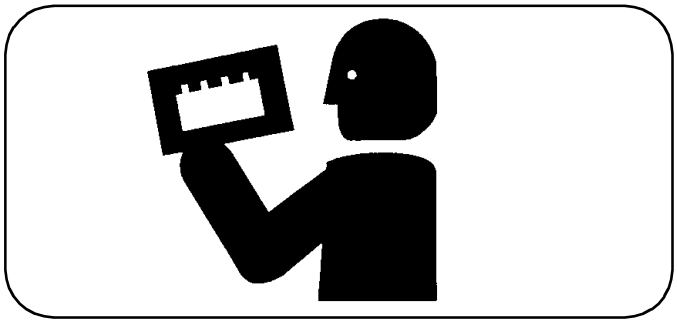
Make sure to install the correct size battery. A smaller or lighter weight battery could seriously affect truck stability. See the truck's specification (data) plate for more information.



Never plug a battery charger into the truck battery connector. Plug battery charger **ONLY** into battery connector from battery.



Follow the charging procedures in the “Battery Instruction Manual” and in the “Battery Charger Instruction Manual”.



Static Safety

Electronic circuit board and devices used on truck can be damaged by the discharge of static electricity, called electrostatic discharge.

Static charges can accumulate from normal operation of truck as well as movement or contact between non-conductive materials such as, plastic bags, synthetic clothing, synthetic soles on shoes, styrofoam coffee cups, etc.

Accumulated static can be discharged through human skin to a circuit board or component by touching the parts. Static discharge is also possible through the air when a charged object is placed close to another surface at a different electrical potential. **Static discharge can occur without seeing or feeling it.**

Whenever working on or near static-sensitive electronics, always use static discharge precautions.

1. Place a static discharge wrist strap around the wrist. Connect the ground lead to the wrist strap connector.

2. Connect the ground clamp to an unpainted, ground surface on truck frame.

3. If removing or installing static-sensitive components, place them on a properly grounded static mat.

4. To transport static-sensitive components, including failed components being returned, place the components in an antistatic bag or box.

The wrist strap and associated accessories should be tested monthly to verify they are working properly. A defective static discharge wrist band will not alert that it is bad.

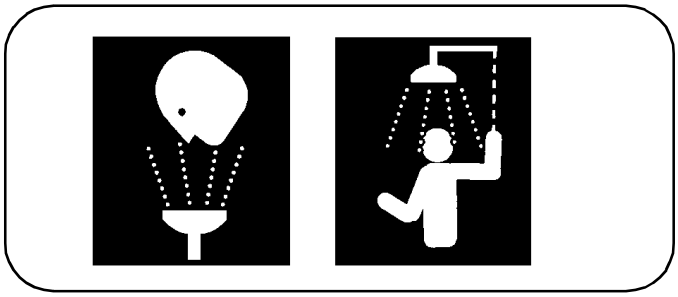
Welding Safety

⚠ WARNING Flame cutting or welding on painted surfaces may produce potentially harmful fumes, smoke and vapors. Prior to performing flame cutting or welding operations, it is recommended that the coating be removed in the vicinity where the operation(s) will be performed.

⚠ WARNING Coating removal may be by mechanical methods, chemical methods or a combination of methods. Flame cutting and/ or welding operations should be carried out only in well ventilated areas using local exhaust if necessary.

Before working on truck, make sure of the following:

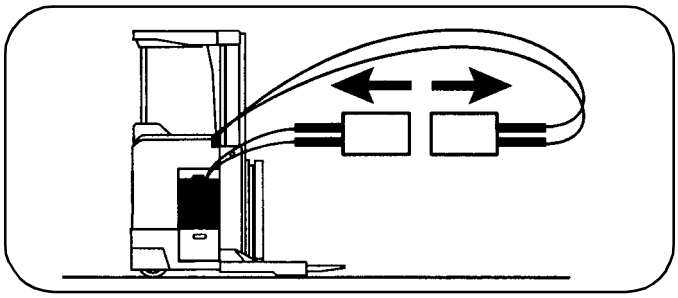
- Fire protection equipment is nearby.
- Know where the nearest eyewash station is located.



⚠ CAUTION Disconnect battery before attempting to inspect, service or repair truck.

- Check for shorts to frame. If any shorts are detected, remove before proceeding with the welding operation.
- Clean the area to be welded.
- Protect all truck components from heat, weld spatter and debris.

- Attach the ground cable as close to the weld area as possible.



- Disconnect all electrical cards before any type of electric resistance welding is done.
- Do not perform any welding operations near the electrical components.
- If welding must be done near the battery compartment, remove the battery from truck.
- When welding is completed, perform all ground tests and electrical inspections before the vehicle is operated.

Introduction, Service Manual

The information in this Service Manual covers models **NR35B**, **NR45B**, **ND30B**, **NS40B**, and **NS50B**.

Federal and State laws require that operators be completely trained in the safe operation of trucks in accordance with OSHA regulation 1910.178.

An Operator's Manual is sent with every **Kalmar AC., Inc.** lift truck when it is manufactured. If the Operator's Manual is missing from the truck, a new manual may be obtained by contacting:

Kalmar AC., Inc.

14481 Lochridge Blvd., Bldg 2

Covington, Georgia 30014

(770) 788-3612

This Service Manual is not a training manual. The information contained in this service manual is intended as a guide to help trained, qualified, and authorized technicians safely service the truck.

The Service Manual is divided into four separate sections, which cover needed information for servicing the truck types. The main subject for each of the sections are as described below.

SECTION	SUBJECT
M	MACHINE INFORMATION
P	PLANNED MAINTENANCE
S	SERVICE INSTRUCTIONS
O	OPTIONS

Contents, Section M

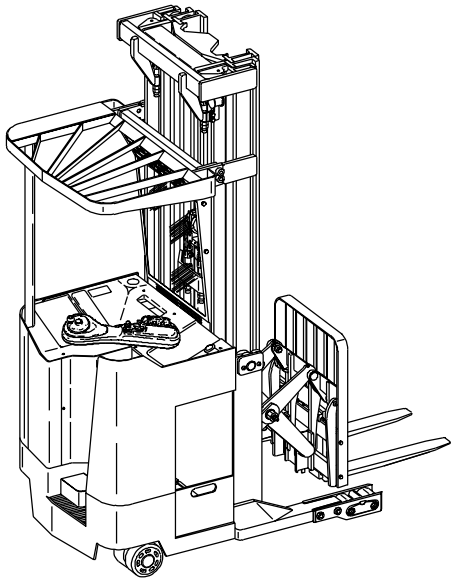
1. Machine Information

M1.0 GENERAL PRODUCT INFORMATION

M2.0 TECHNICAL SERVICE DATA

M3.0 ORDERING SPARE PARTS

Contents, Section M



General Product Information

1. Presentation of the Rider Trucks.

The **NR35B/45B** are battery powered reach trucks. The **ND30B** is a battery powered deep reach truck. The **NS40B/50B** are battery powered straddle arm trucks.

These trucks are intended solely to be operated handling pallets or similar load carriers indoors. The trucks are equipped with a steering wheel with all the controls for operating within easy access.

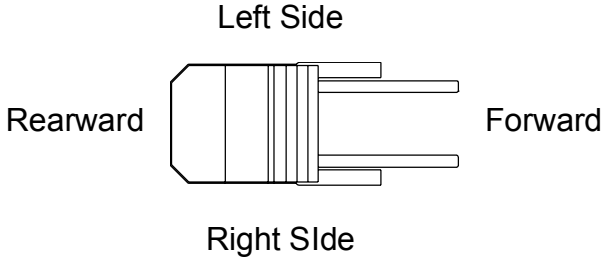
The trucks have various maximum lifting capacities (review data plate on the truck to note the maximum lifting capacity) and are equipped with a 24V or 36V electrical system. Speed of the truck is regulated by means of a transistor controller to provide infinite control of acceleration and speed while driving.

The forks and auxiliary functions are controlled by means of a transistor controller. Control of the lift and auxiliary functions are done electrically with the levers on the control pod. Control of the speed and positioning of the forks when stacking is done by the position of the levers.

The trucks can be fitted with different accessories including sideshifter, warning light, lights/fan package, travel alarm, and adjustable driving lights. The trucks can be specially equipped to work in cold conditions.

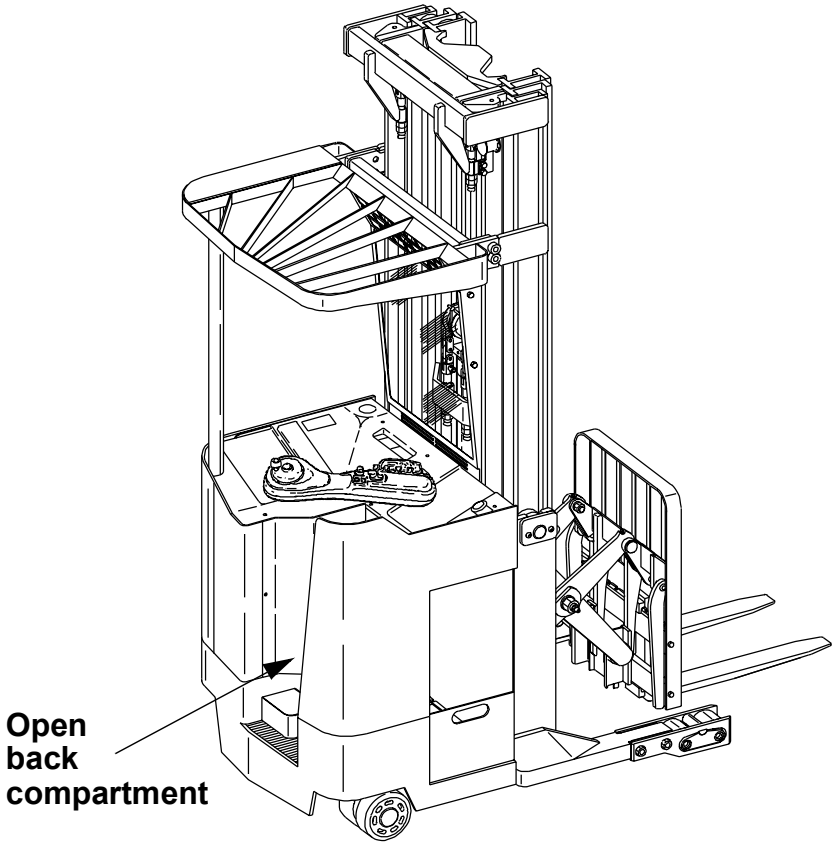
1.1. Truck Side Views

The terms rearward and forward used indicate the front and back side of the truck as viewed from the operator's line of sight for proper operation of truck. The terms right-hand and left-hand used indicate the right and left side of the truck as viewed from the operator's line of sight for proper operation of truck.



1.2. Open Back Compartment

The truck compartment has an open back design. The United States Department of Labor Occupational Safety and Health Administration (OSHA) has determined that when a stand up narrow aisle lift truck tips over the operator should be trained to step off the truck. The open back design allows the operator to make the quickest exit from the truck should the truck begin to tip over or fall from an elevated height such as a loading dock or ramp. The ease of entering and exiting the open back design also minimizes operator fatigue.



1.3. Intended Truck Application

The trucks are solely designed and manufactured to handle goods. The trucks should be fitted with the appropriate accessories relevant to the application.

1.4. Prohibited Truck Application

The trucks are designed for handling goods indoors. It is not permitted to use the trucks for other purposes including the following:

- As a towing tractor for trailers.
- To tow other trucks.
- To transport/lift passengers.
- To drive on gravel or grass.

1.5. Truck Data

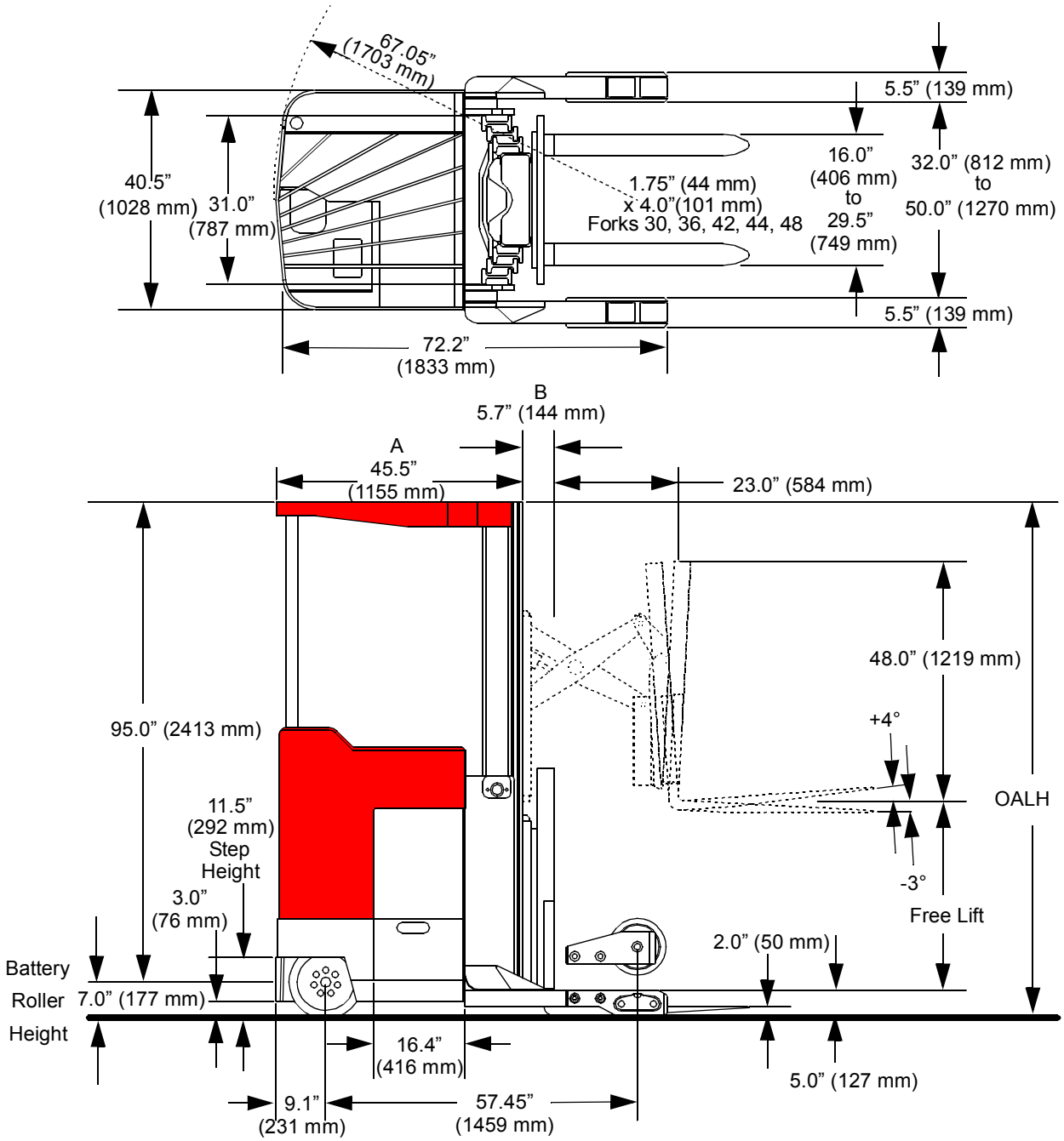
The following table provides information regarding some technical data which is of value with daily use of the trucks.

Truck data	NR35B	NR45B	ND30B	NS40B	NS50B
Lifting capacity rated load lb (kg)	3500 (1587)	4500 (2041)	3000 (1360)	4000 (1814)	4000 (2267)
Lift height, inches (mm)	192-270 (4876-6858)	210-402 (5334-10210)	210-402 (5334-10210)	192-270 (4876-6858)	210-402 (5334-10210)
Operating speed without load, mph	**24 Volt** 6.0 mph **36 Volt** 6.5 mph	**36 Volt** 6.5 mph	**36 Volt** 6.5 mph	**24 Volt** 6.0 mph **36 Volt** 6.5 mph	**36 Volt** 6.5 mph
Operating speed with load, mph	**24 Volt** 5.5 mph **36 Volt** 6.0 mph	**36 Volt** 6.0 mph	**36 Volt** 6.0 mph	**24 Volt** 5.5 mph **36 Volt** 6.0 mph	**36 Volt** 6.0 mph
Service weight without battery, lb (kg)	**240 Mast** 5595 (2537)	**210 Mast** 5915 (2682)	**330 Mast** 6945 (3150)	**210 Mast** 4645 (2106)	**210 Mast** 5530 (2508)
Service weight including battery, lb (kg)	Above + battery weight	Above + battery weight	Above + battery weight (2600 min)	Above + battery weight (2400 min)	Above + battery weight (2400 min)

The lifting capacity, lifting height, and weight of the truck can be found on the truck data plate.

1.6. NR35B Dimensions

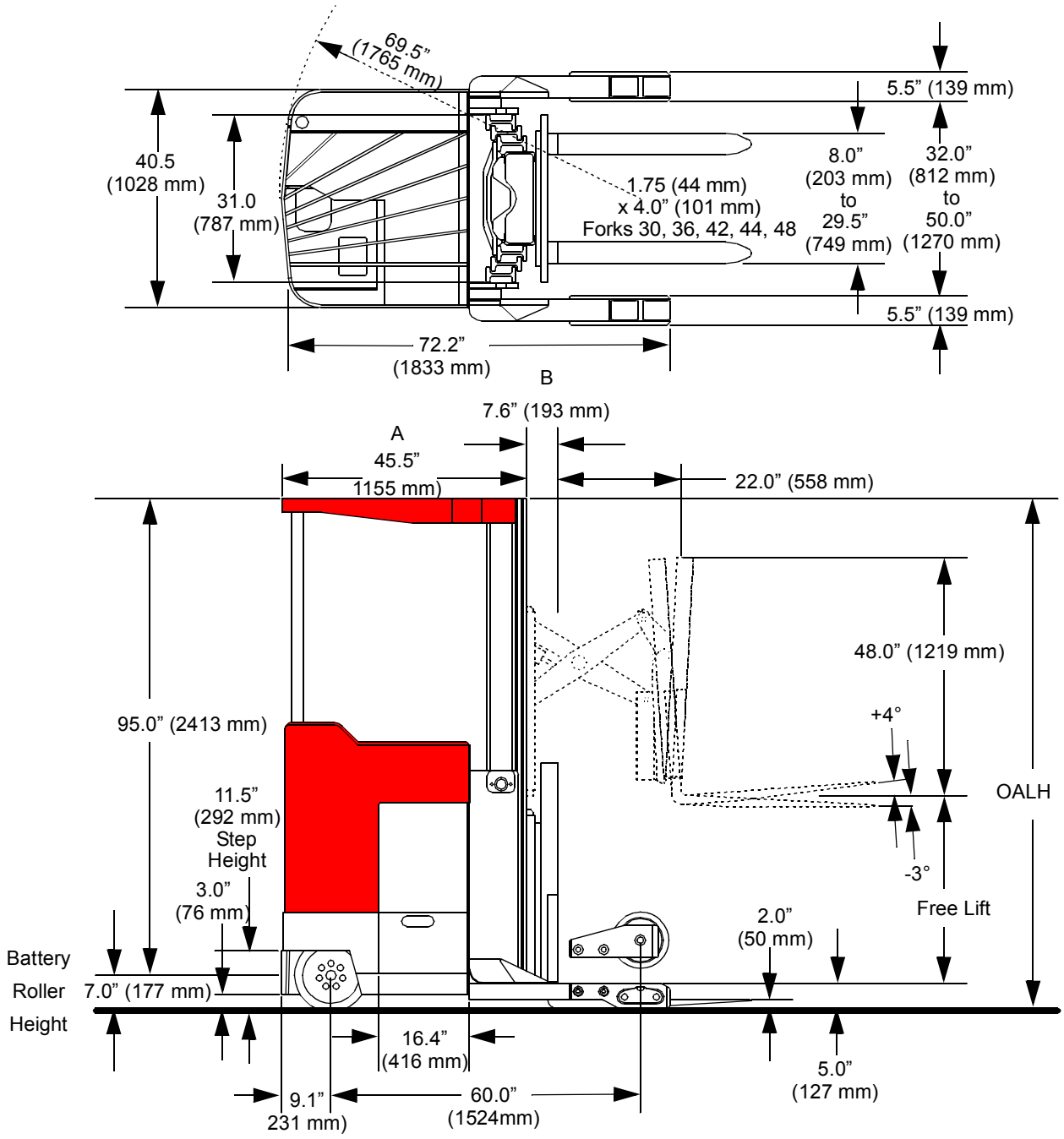
The following diagram shows external dimensions for the NR35B truck in its standard design.



10% Gradient Performance-Loaded

1.7. NR45B Dimensions

The following diagram shows external dimensions for the NR45B truck in its standard design.



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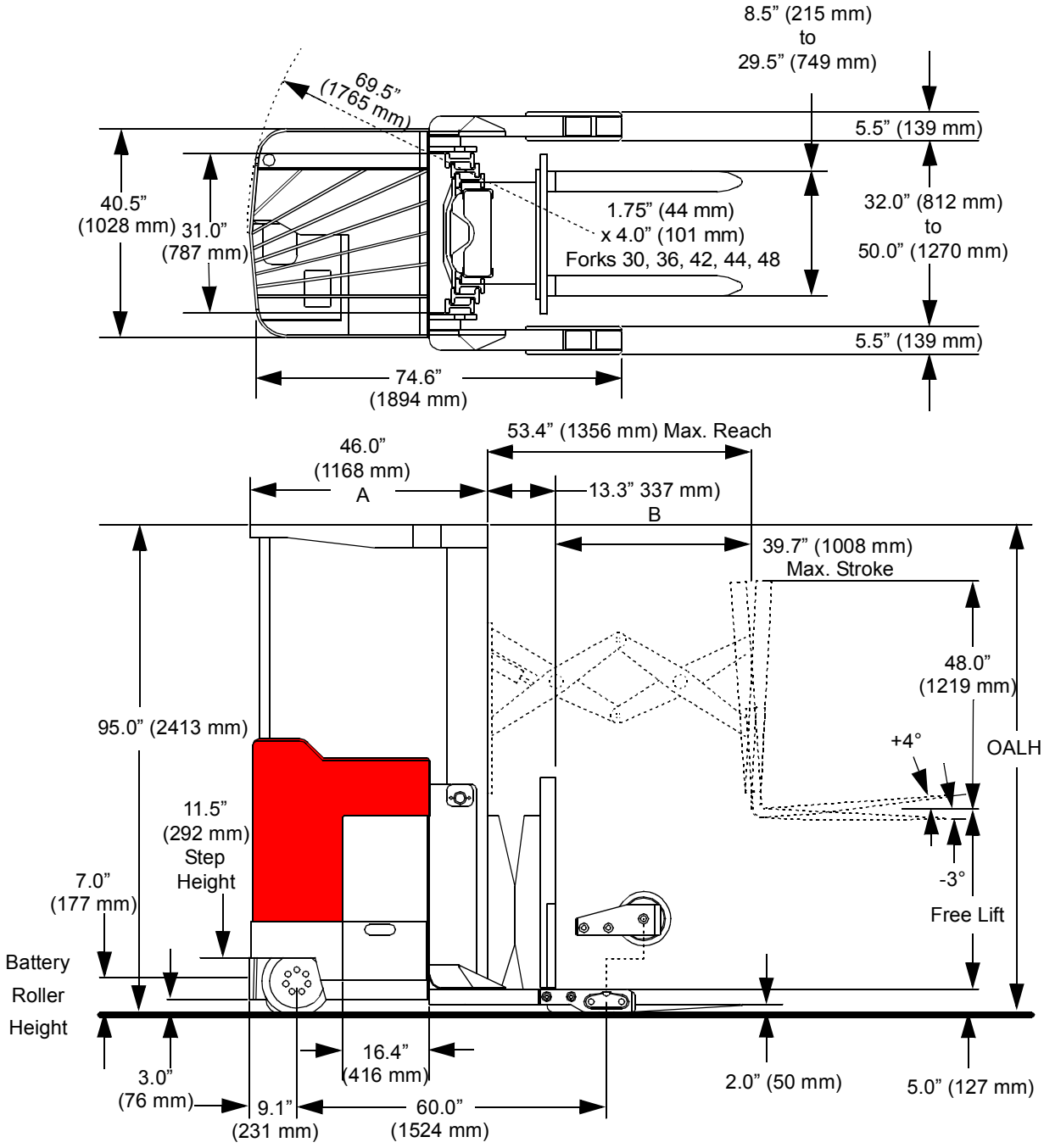
1.8. ND30B Dimensions

The following diagram shows external dimensions for the ND30B truck in its standard design.



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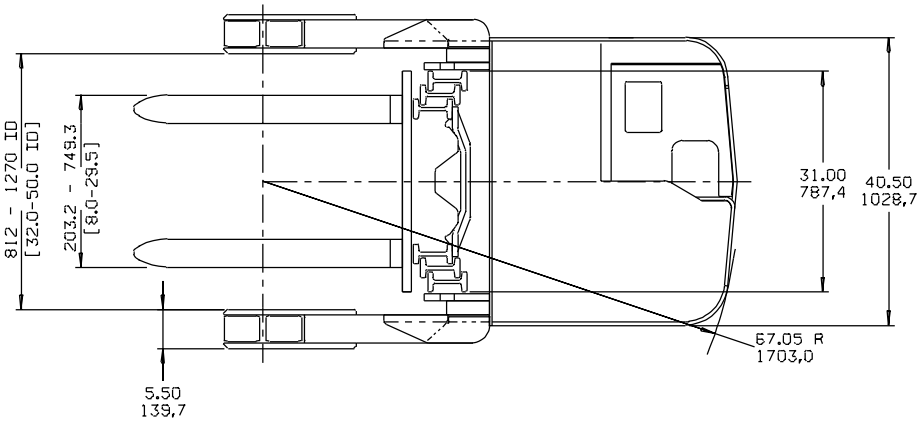
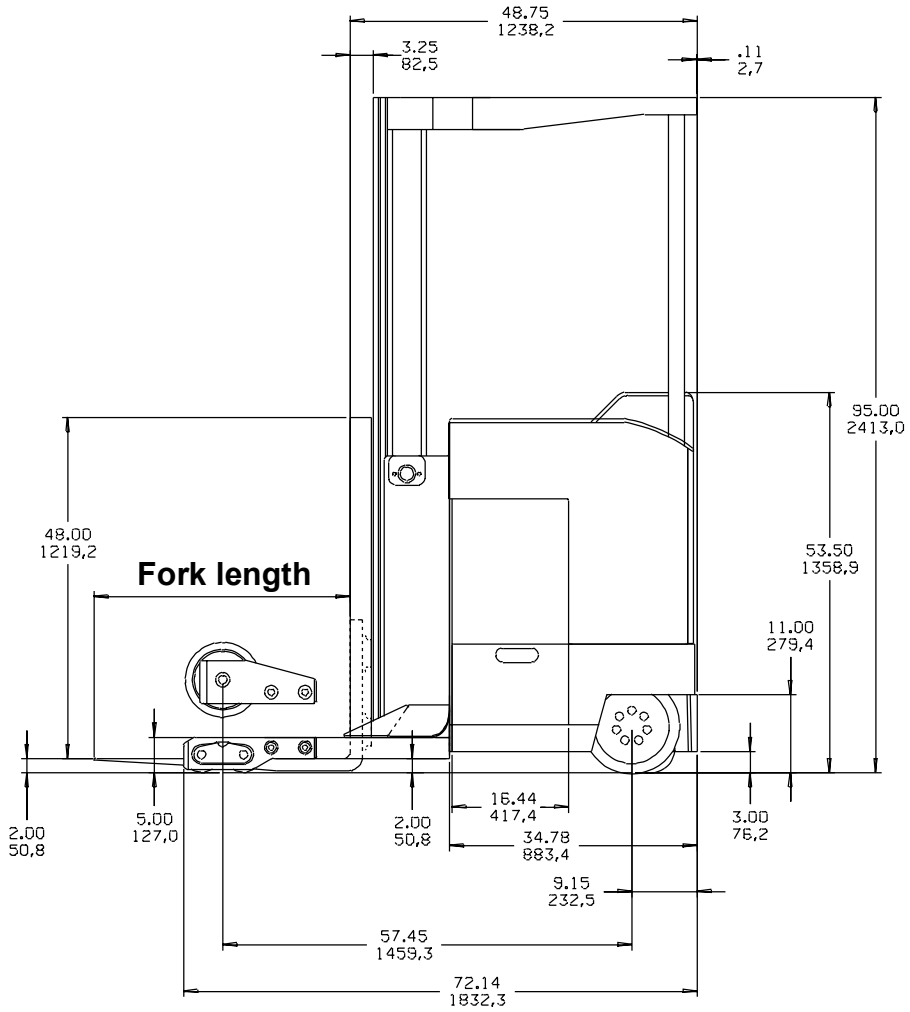
1.9. NS40B Dimensions

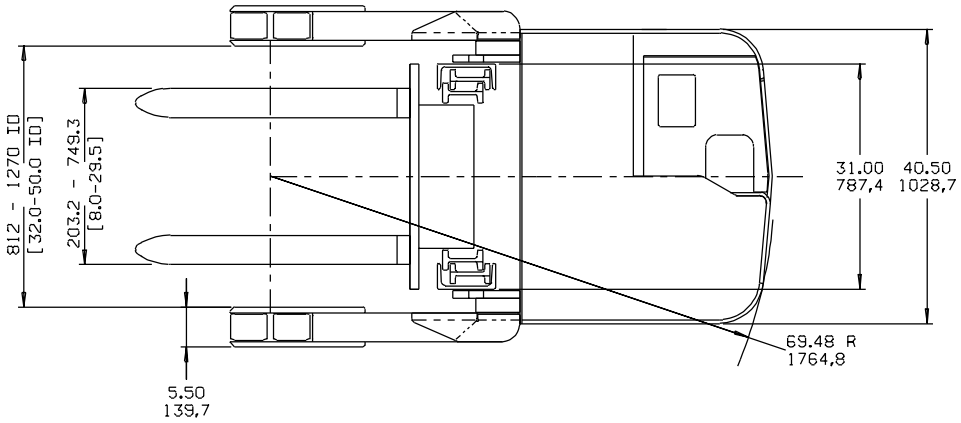
The following diagram shows external dimensions for the NS40B truck in its standard design.

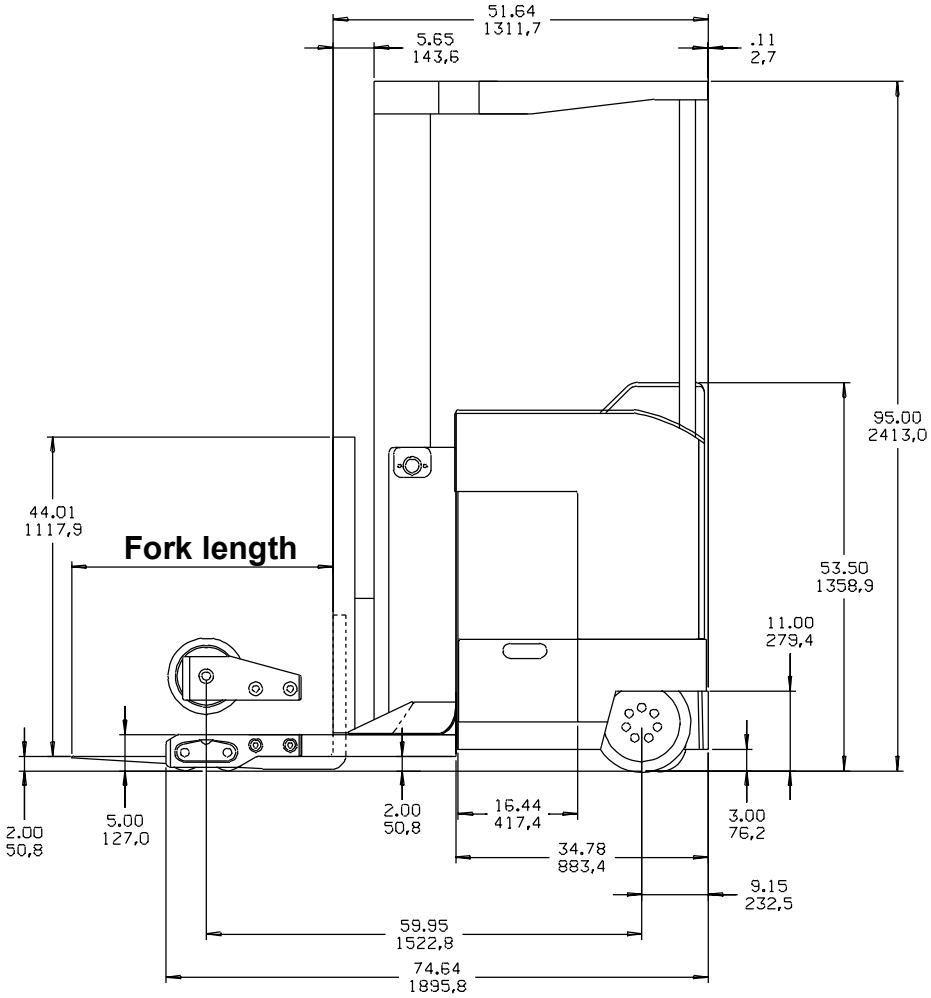




1.10. NS50B Dimensions

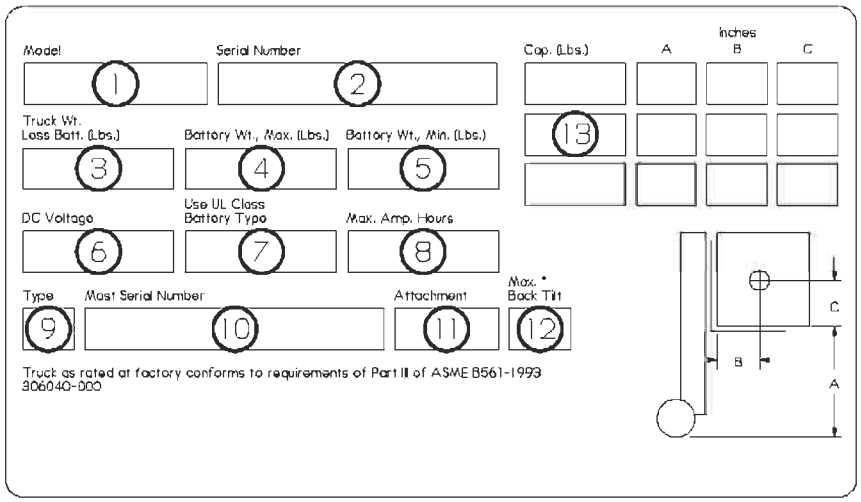
The following diagram shows external dimensions for the NS50B truck in its standard design.





1.11. Data Plate

The illustration below shows the data plate used on the truck.



Legend

1 Truck model number
2 Truck serial number
3 Weight less battery
4 Maximum battery weight
5 Minimum battery weight
6 Truck voltage DC
7 Battery type UL class
8 Battery maximum AMP hours
9 Truck type
10 Mast serial number
11 Attachment
12 Maximum degree rear tilt
13 Truck capacity

2. Main Components

1 Hydraulic valve:
The valves are located to provide easy access.

2 Battery:
24/36V with different capacities and weights.

3 Battery connector:
The truck is connected to the battery through the battery connector. When charging the battery, do not connect the battery charger to the battery connector at the truck chassis.

4 Hydraulic unit:
Pump motor and hydraulic pump are an integrated unit.

5 Drive unit with brake:
Drive motor, gears, drive wheel and electrical brake combined in the drive unit.

6 Electrical steering:
A servo steer motor drives a gear ring, enabling the drive unit to be rotated through 360 degrees in either direction.

7 Data plate:
See “Data Plate” on page 41.

8 Cover:
Removable to provide access for servicing.

9 Pedal:
Brake pedal.

10 Control console:
The control console can be adjusted to a suitable height and angle to obtain a comfortable working position. The steering, hydraulic functions, horn, parking brake, preset height, travel direction, key switch, and any extra hydraulic functions are all controlled from this console. The position of the console may be set in 1 of 3 positions; forward facing, 45 degrees, or side stance.

11 Instrument panel:
This provides information on the truck’s running hours, time display, error codes, travel direction, parking brake, steering angle and battery status.

12 Mast:
The mast is a clear view model.

13 Electronics:
The electronics are in a protected compartment.

14 Control circuit fuse: (for fuse size and part number see page 59)

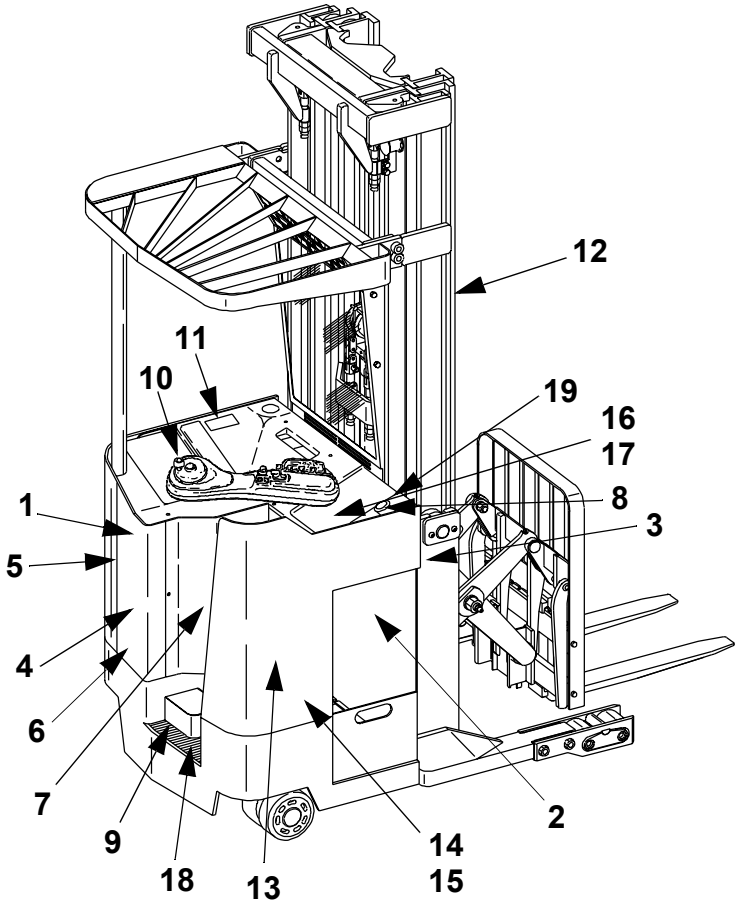
15 Steering circuit fuse: (for fuse size and part number see page 59)

16 Drive motor fuse: (for fuse size and part number see page 59)

17 Pump motor fuse: (for fuse size and part number see page 59)

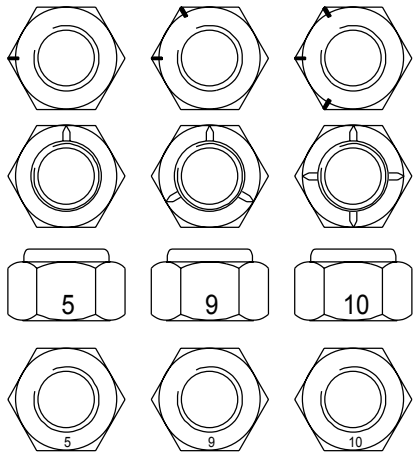
18 Right foot pedal
An operator must keep all of his or her body in the operator's compartment at all times. The area of the operator's compartment in the truck is designed so that an operator can do so. A red triangle (reminder light) will be displayed on the instrument panel if the right foot pedal is not depressed. This feature reinforces that the operator must take advantage of the area of the operator's compartment and keep all of his or her body in the compartment.

19 Emergency stop
The emergency stop switch will stop all control and power functions.



Main Components of Truck

Inch (SAE) and Metric Fasteners



1. Introduction

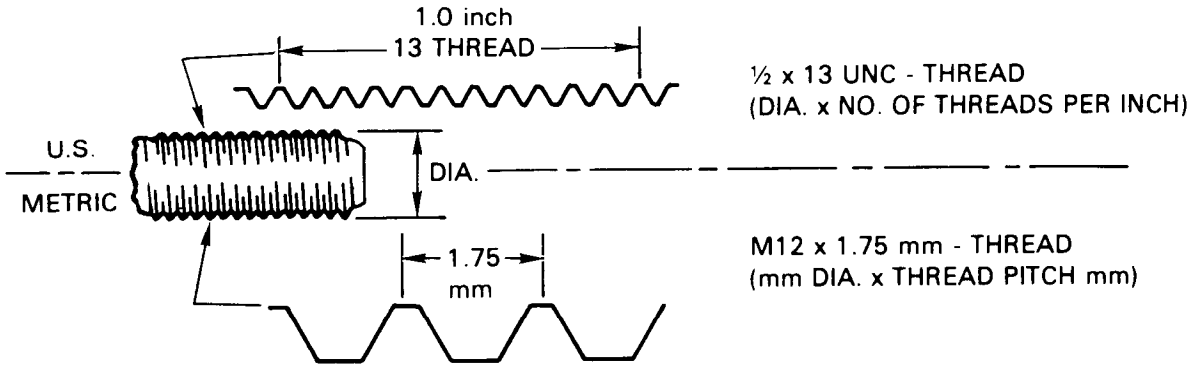
Threaded fasteners such as bolts, nuts, cap screws, and studs are made to specifications that describe the mechanical strength and hardness of the fastener. A fastener used in a design application is selected in accordance with its specifications. Parts used on this truck are purchased from many countries. Many of these fasteners are similar but cannot be used as direct replacements.

Service persons must use replacement fasteners that have the same specifications. Fasteners made to each specification have identification marks for that specification. This specification is commonly called “grade” for SAE standards and “property” for metric standards. This section describes the identification of some common fasteners.

The metric system used is described as SI (International System of Units, also called SI in all languages). The SI system of measurement is described in ISO Standard 1000, 1973.

2. Nomenclature, Threads

The thread design is specified by a series of numbers and letters for inch and metric fasteners (see figure below). The diameter of the shank of the fastener is shown first in the series, e.g. M12=12 mm, M20=20 mm (1/2=1/2 inch, 3/4=3/4 inch).



The number of threads per inch is normally not shown for inch nomenclature and only the UNC (Unified National Coarse) or UNF (Unified National Fine) is shown. This number of threads per inch is not shown because a UNC or UNF fastener has a standard number of threads per inch for a specific diameter.

The length of a shank is often indicated as part of the description of a fastener. This length is shown in inches for inch fasteners and in millimeters for metric fasteners.

A cap screw will have the following description:

Inch	Metric
1/2 x 13 UNC x 1-1/2 A B C D	M12 x 1.75 x 50 A B C
A = Shank diameter B = Number of threads per unit of length C = Type of thread D = Shank length	A = Thread size B = Pitch C = Length

3. Strength Identification

The most common property classes for metric fasteners are 8.8 and 10.9. The property class is marked with a number on the head of the cap screw or on a nut. Property classes less then 8.8 are often not marked. Grades for inch bolts go from 2 to 8. Grade 2 fasteners normally do not have marks. The following tables show the marks that identify the grades and property classes for different fasteners.

WARNING When fasteners must be replaced the new fasteners must be of the same strength or greater than the original fasteners. The new fasteners must also be the correct size.

NOTE! Identification marks are according to bolt strength. The higher the number, or the increase in the number of marks, indicates increased bolt strength.

Table 1. Bolt and Screw Designations

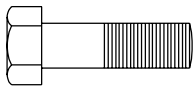
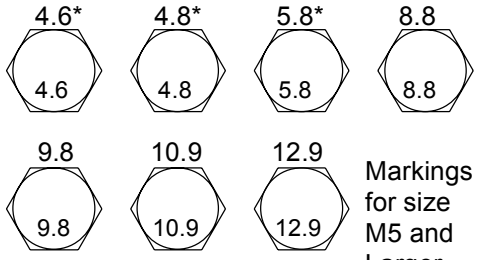
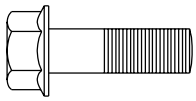
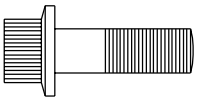
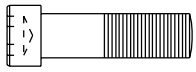
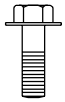
Types of Fasteners	**Inch Fasteners** Strength Levels: SAE Grades	**Metric Fasteners** Strength Levels: Property Classes * Markings Not Required
 Hex Head Bolts & Cap Screws		 Markings for size M5 and Larger
 Hex Head Flange Screws		Same As Above
 12 Point Flange Screws		
 Hex Socket Head Cap Screws	Markings Not Required	
 SEMS		

Table 2. Stud and Nut Designations

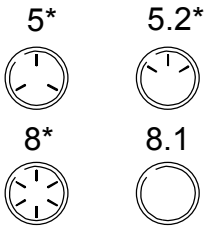
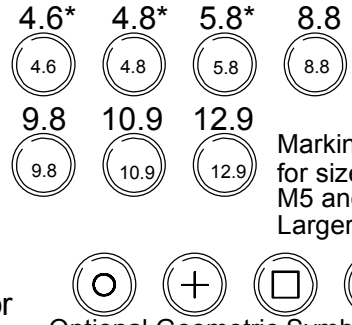
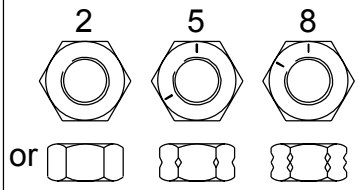
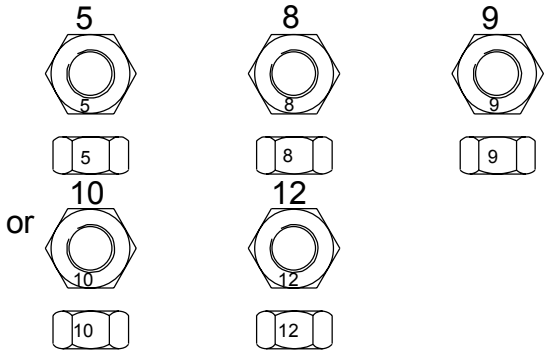
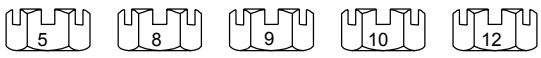
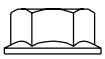
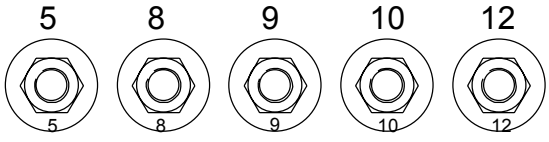
Types of Fasteners	**Inch Fasteners** Strength Levels: SAE Grades * Markings Not Required	**Metric Fasteners** Strength Levels: Property Classes * Markings Not Required
 Studs		
 Hex Nuts		
 Hex Slotted Nuts	Markings Not Required	
 Hex Flange Nuts	Markings Not Required	

Table 3. Torque Nut Designations

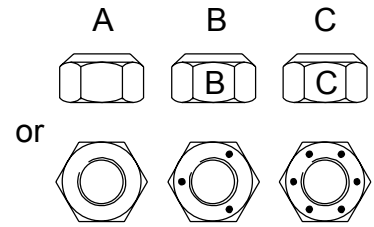
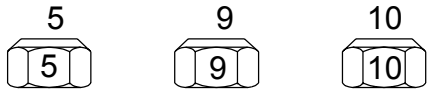
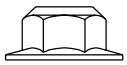
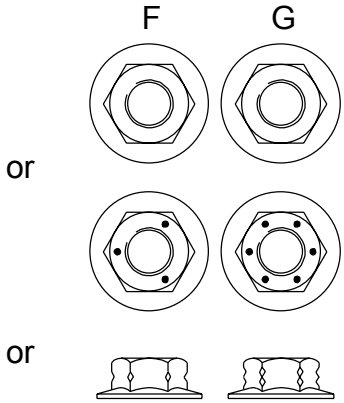
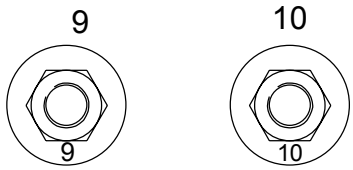
Types of Fasteners	**Inch Fasteners** Strength Levels: SAE Grades	**Metric Fasteners** Strength Levels: Property Classes
 All Metal Prevailing Torque Nuts		
 All Metal Prevailing Torque Flange Nuts		

Table 4. Torque Nut with Nylon Insert Designations

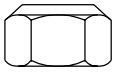
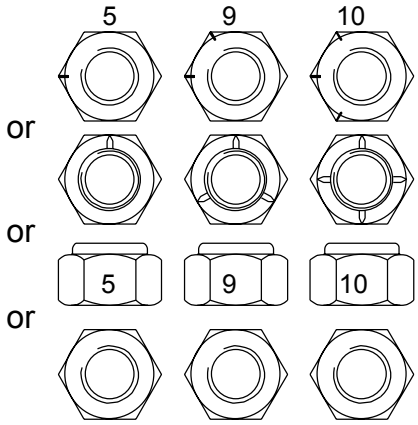
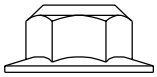
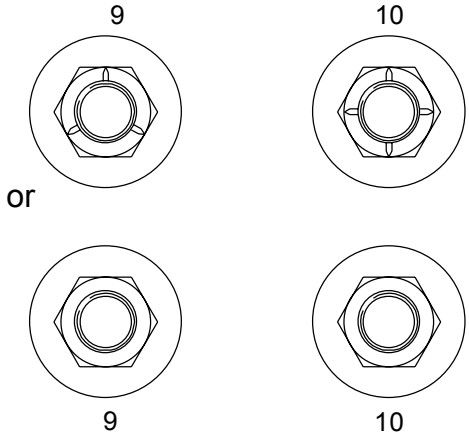
Types of Fasteners	**Inch Fasteners** Strength Levels: SAE Grades	**Metric Fasteners** Strength Levels: Property Classes
 Nylon Insert Prevailing Torque Nuts	Markings Not Required	
 Nylon Insert Prevailing Torque Flange Nuts	Markings Not Required	

Table 5. Fastener Torque Values

Size and Pitch	Property, Class 8.8*		Property, Class 10.9**		Property, Class 12.9***	
	N•m	in-lb	N•m	in-lb	N•m	in-lb
M5 x 0.8 M6 x 1 M8 x 1.25	5-6 8-10 20-25	44-53 71-88 177-221	7-8 12-14 30-35	62-71 106-124 ----------	8-10 14-16 ----------	71-88 124-142 ----------
	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb
M8 x 1.25 M10 x 1.5	---------- 40-45	---------- 30-33	---------- 60-65	22-26 44-48	34-40 70-75	26-30 52-55
M12 x 1.75 M14 x 2	70-80 110-125	30-33 52-59	100-110 155-180	74-81 114-133	115-130 180-210	85-96 133-155
M16 x 2 M20 x 2.5	170-190 340-380	125-140 251-280	240-270 450-500	177-199 332-369	280-320 550-600	207-236 406-443
M24 x 3	580-650	428-479	800-900	590-664	900-1050	664-774
M30 x 3.5	1150-1300	848-959	1600-1800	1180-1328	1850-2100	1364-1549
M36 x 4	2000-2250	1479-1660	2800-3150	2065-2323	3250-3700	2397-2729

* Property class 8.8, Protective Treatment CMHC Specification “H” (zinc phosphate), applies also to internally threaded fasteners made of property class 8 material.

** Property class 10.9, Protective Treatment CMHC Specification “H” (zinc phosphate), applies also to internally threaded fasteners made of property class 10 material.

*** Property class 12.9, Protective Treatment CMHC Specification “H” (zinc phosphate), applies also to internally threaded fasteners of property class 12 material.

Truck Torque Specifications	
Description	**Torque Specification**
Steering motor gear mounting bolt	88 in-lb (10 N•m)
Motor terminals	140 in-lb (15.82 N•m)
Motor pole piece screws	250-300 in-lb (28-33 N•m)
Pump motor mounting bolts	14-18 ft-lb (19-24 N•m)
Pump motor electrical power cable nuts	100-120 in-lb (11.3-13.6 N•m)
Drive motor mounting bolts	20-25 ft-lb (30-35 N•m)
Transmission mounting bolts	50-59 ft-lb (68-80 N•m)
Drive wheel nuts	65 ft-lb (88 N•m)
Overhead guard mounting bolts	200 ft-lb (271 N•m)
Drive axle retaining bolts	81 ft-lb (109 N•m)
Steering gear ring bolts	50-59 ft-lb (68-80 N•m)
Steer motor shaft	Loctite® 243®
Drive tire lug nut	95 ft-lb (129 N•m)
Transmission axle bearing preload	9-14 in-lb (1.01-1.58 N•m)
Transmission bevel gear nut	90 ft-lb (122 N•m)
Transmission pinion nut	110-120 ft-lb (149-162 N•m)
Transmission pinion bearing preload	5-8 in-lb (0.56-0.90 N•m)
Transmission cover bolts	18 ft-lb (24 N•m)
Transmission case	Loctite® 515®
Hydraulic collar mounting bolts	44.4 in-lb (5.01 N•m)
Tilt cylinder piston nut (NR45B/ND30B)	60-65 ft-lb (81-88 N•m)
Lift chain adjusting nuts and locknuts	200 ft-lb (271 N•m)
Control valve assembly hose fastener nut Control valve double solenoid screw and mounting screw Control vale plug Control valve block screw Control valve spring ball screw	480 ± 25 in lb (54 N•m) 14.75 ft-lb (20 N•m) 11.06 ft-lb (15 N•m) 5.9 ft-lb (8 N•m) 8.85 ft-lb (12 N•m)

Truck Torque Specifications	
Description	**Torque Specification**
Lower mast mounting bolts	400 ft-lb (543 N•m)
Overhead guard post base bolts	25 ft-lb (34 N•m)
Reach cylinder piston locknut (NR35B/NR45B/ND30B)	47.94 ft-lb (65 N•m)
Mast mounting plate bolts	85 ft-lb (115 N•m)
Sideshifter lower hook bolts Sideshifter lower hook set screw (NR35B S/N 27091-000-28075000; NR45B S/N 27091000-28266000; ND30B S/N 27091000-28266000)	55 ft-lb (74 N•m) 42 ft-lb (57 N•m)
Sideshifter lower hook bolts Sideshifter lower hook set screw Sideshifter safety screw Sideshifter cylinder hydraulic fittings (NR35B S/N 28075001 - UP; NR45B S/N 28266001 - UP; ND30B S/N 28266001 - UP; NS40B S/N 2830800 - UP; NS50B S/N 28308000 - UP)	65 ft-lb (88 N•m) 21 ft-lb (28 N•m) 70 ft-lb (95 N•m) 56 ft-lb (76 N•m)
Reach outer arm jam nut (NR35B)	34.36 ft-lb (47 N•m) Loctite® 243®
Reach outer arm jam nut (NR35B/45B/ND30B)	Loctite® 243®

4. Conversion of Metric and English Units

AREA					
Multiply	**By**	**To Get**	**Multiply**	**By**	**To Get**
inches²	6.451	centimeters² (cm²)	centimeters²	0.155	inches² (in²)
feet²	0.093	meters² (m²)	meters²	10.764	feet² (ft²)
LINEAR					
Multiply	**By**	**To Get**	**Multiply**	**By**	**To Get**
inches	25.4	millimeters(mm)	millimeter	0.039	inches (in)
feet	0.305	meters (m)	meter	3.280	feet (ft)
yards	0.914	meters (m)	meter	1.094	yards (yd)
miles	1.609	kilometers (km)	kilometer	0.621	miles (mi)
MASS					
Multiply	**By**	**To Get**	**Multiply**	**By**	**To Get**
ounces (oz)	28.49	grams (g)	grams	0.035	ounces (oz)
pounds (lb)	0.454	kilograms (kg)	kilograms	2.205	pounds (lb)
tons (2000 lb)	907.18	kilograms (kg)	kilograms	0.001	tons (2000 lb)
tons (2000 lb)	0.907	metric ton (t)	metric ton	1.102	tons (2000 lb)
POWER					
Multiply	**By**	**To Get**	**Multiply**	**By**	**To Get**
horsepower	0.746	kilowatts (kW)	kilowatts	1.34	horse-power(hp)
PRESSURE					
Multiply	**By**	**To Get**	**Multiply**	**By**	**To Get**
pounds/in²	6.895	kilopascal (kPa)	kilopascals	0.145	pounds/in² (psi)
pounds/in²	0.007	megapascal (MPa)	megapascals	145.04	pounds/in² (psi)

TEMPERATURE					
Multiply	**By**	**To Get**	**Multiply**	**By**	**To Get**
(Fahrenheit -32)	0.56	Celsius (C)	(Celsius x 1.8)	+32	Fahrenheit (F)
TORQUE					
Multiply	**By**	**To Get**	**Multiply**	**By**	**To Get**
inch pound	0.113	Newton meter (N•m)	Newton meter	8.851	inch pounds in-lb
feet pound	1.356	Newton meter (N•m)	Newton meter	0.738	foot pounds ft-lb
VELOCITY					
Multiply	**By**	**To Get**	**Multiply**	**By**	**To Get**
miles/hour	1.609	kilometer/hour (km/h)	kilometer/ hour	0.621	miles/hour (mph)
VOLUME					
Multiply	**By**	**To Get**	**Multiply**	**By**	**To Get**
inches³	16.387	centimeters³ (cm³)	centimeters³	0.061	inches³ (in³)
inches³	0.016	liters	liters	61.024	inches³ (in³)
quarts, U.S.	0.946	liters	liters	1.057	quarts, U.S. (qt)
quarts, U.S.	0.83	quarts, Imp. (qt)	quarts, Imp.	1.205	quarts, U.S. (qt)
gallons, U.S.	3.785	liters	liters	0.264	gallons, U.S. (gal)
gallons, U.S.	0.83	gallons, Imp. (gal)	gallons, Imp.	1.205	gallons, U.S. (gal)
ounces	29.57	milliliters (ml)	milliliters	0.034	ounces (oz)

Technical Service Data

⚠ WARNING When the battery is fully charged, performance may vary due to motor and system efficiency tolerance. Technical service data represents nominal values obtained under typical operating conditions. Specifications are subject to change without notice.

MODEL			
	NR35B - NS40B	**ND30B**	**NR45B - NS50B**
DRIVE MOTOR			
Type	Series - DC	Series - DC	Series - DC
Power			
Duty factor	1 Hour Continuous	1 Hour Continuous	1 Hour Continuous
Minimum brush length	0.8 inch (20 mm)	0.8 inch (20 mm)	0.8 inch (20 mm)
Minimum commutator diameter	2.90 inches (74 mm)	2.90 inches (74 mm)	2.90 inches (74 mm)
Minimum brush spring tension	6.4 oz (180 grams)	6.4 oz (180 grams)	6.4 oz (180 grams)
TRANSMISSION/GEAR			
Type	Vertical motor spiral-bevel output	Vertical motor spiral-bevel output	Vertical motor spiral-bevel output
Gear ratio	17.57	17.57	17.57
Oil volume	1 gal (4 liters)	1 gal (4 liters)	1 gal (4 liters)
TRANSMISSION/GEAR AMBIENT TEMPERATURES			
Standard and corrosion continuous operation (see page 68) above 23°F (-5°C)	SAE 80W90		
Cold Storage (see page 68) Continuous operation 5°F (-15°C) Intermittent operation -13°F (-25°C)	SAE 80W/90		
Freezer continuous operation To -31°F (-35°C) (see page 70)	ATF		

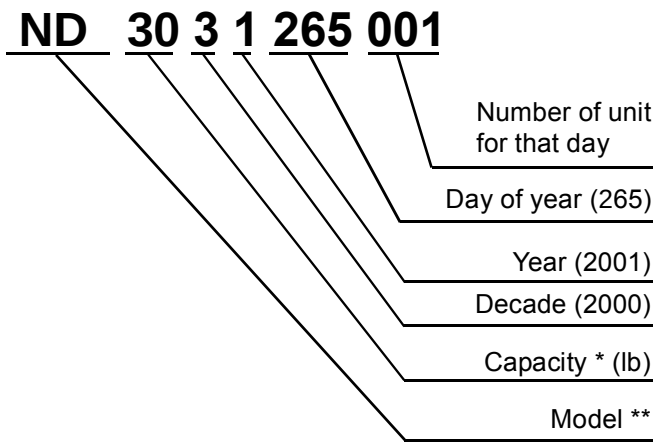
MODEL			
	NR35B - NS40B	**ND30B**	**NR45B - NS50B**
WHEELS			
Drive wheel inch (mm)	13.5 x 5.5 x 10.0 (342.9 x 139.7x 254)	13.5 x 5.5 x 10.0 (342.9 x 139.7x 254)	13.5 x 5.5 x 10.0 (342.9 x 139.7x 254)
Drive wheel weight without load with battery	**240 Mast** 3175 lb (1440 kg)	**330 Mast** 3595 lb (1630 kg)	**402 Mast** 3875 (1757 mm)
Drive wheel weight with rated load and battery	**240 Mast** 2385 lb (1081 mm)	**330 Mast** 2670 lb (1211 mm)	**402 Mast** 3184 lb(1444 mm)
Torque drive tire lug nut	95 ft-lb (129 N•m)		
Load wheel	5.0 x 3.6 inches (127 x 91 mm)	5.0 x 3.6 inches (127 x 91 mm)	5.0 x 3.6 inches (127 x 91 mm)
Load wheel weight with rated load	6975 lbs (3163807 g)		
HYDRAULIC UNIT			
Power	24 V - 36 V - 9.8 Kw 13.1 hp	36 V -	36 V -
Revolutions/minute at work pressure	2200 rpm	2550 rpm	2550 rpm
Duty factor	20% on 5 min. cycles	20% on 5 min. cycles	20% on 5 min. cycles
Minimum brush length	0.8 inch (20 mm)	0.62 inch (16 mm)	0.62 inch (16 mm)
Minimum commutator diameter	2.90 inches (74 mm)	2.80 inches (71 mm)	2.80 inches (71 mm)
Minimum brush spring tension	6.4 oz (180 g)	40 oz (1120 g)	40 oz (1120 g)
Pressure at rated load	2450 psi	2400 psi	2450 psi
Pump displacement	24 V - 13 cc 36 V - 19 cc	36 V - 27 cc	36 V - 27 cc
Tank volume	5 gal (19 liters)	5 gal (19 liters)	5 gal (19 liters)
HYDRAULIC UNIT AMBIENT TEMPERATURES			
Standard and corrosion continuous operation (see page 68) above 23°F (-5°C)	Sunoco TH		

MODEL			
	NR35B - NS40B	**ND30B**	**NR45B - NS50B**
Cold Storage (see page 68) Continuous operation 5°F (-15°C) Intermittent operation -13°F (-25°C)	ATF		
Freezer continuous operation To -31°F (-35°C) (see page 70)	Texaco 15		
FUSES			
Drive motor circuit	250A fuses, part number 305656-000		
Pump motor circuit	425A, 24V part number 305656-002 355A, 36V part number 305656-001	2 - 250A fuses F3 & F4 part number 305656-000	2 - 250A fuses (F3 & F4) part number 305656-000
Control circuit	15A (NR35B) part number 122308-150 (S/N 27091000-27135000) 10A part number 25275-12 (S/N 27135001 - UP)	10A part number 25275-12	15A (NR45B) part number 122308-150 (S/N 27091000-27135000) 10A part number 25275-12 (S/N 27135001 - UP)
Steering circuit	30A (S/N 27135001 - UP) part number 25275-13 30A (S/N 27091000 - 27135000) part number 122308-300		
BATTERIES			
Dimension W x L x H inches (mm)	14.4 x 38.8 x 32.0 (355 x 985 x 812) 16.4 x 38.8 x 32.0 (416 x 985 x 812)	16.4 x 38.8 x 32.0 (416 x 985 x 812) 21.0 x 38.8 x 32.0 (533 x 985 x 812)	16.4 x 38.8 x 32.0 (416 x 985 x 812) 21.0 x 38.8 x 32.0 (533 x 985 x 812)
Capacity (Max. Amp-hrs.)	24 V - 1395 36 V - 1240	36 V - 1240	36 V - 1240
Weight Minimum (Maximum)	**14.5 inch** 1600 lb (726 mm) 2300 lb (1043 mm) **16.5 inch** 2000 lb (907 mm) 2300 lb (1043 mm))	**16.5 inch** 2000 lb (907 mm) 2300 lb (1043 mm) **21.0 inch** 2600 lb (1179 mm) 2900 lb (1315 mm)	**16.5 inch** 2000 lb (907 mm) 2300 lb (1043 mm) **21.0 inch** 2400 lb (1089 mm) 2900 lb (1315 mm)
DRIVING SPEEDS			
Without load	24 V - 6.0 mph 36 V - 6.5 mph	36 V - 6.5 mph	36 V - 6.5 mph
With rated load	24 V - 5.5 mph 36 V - 6.0 mph	36 V - 6.0 mph	36 V - 6.0 mph

MODEL			
	NR35B - NS40B	**ND30B**	**NR45B - NS50B**
LIFTING/LOWERING TIME			
Lift without load	24 V - 60 fpm 36 V - 80 fpm	36 V - 94 fpm	36 V - 94 fpm
Lift with rated load	24 V - 40 fpm 36 V - 60 fpm	36 V - 60 fpm	36 V - 60 fpm
Lower without load, electrical valve	75 fpm	90 fpm	90 fpm
Lower with rated load, electrical valve	80 fpm	95 fpm	95 fpm
CURRENT READINGS			
Driving without load	24 V - 140 amp 36 V - 140 amp	36 V - 150 amp	36 V - 150 amp
Driving with rated load	24 V - 160 amp 36 V - 165 amp	36 V - 170 amp	36 V - 170 amp
Lifting without load	24 V - 36 V - 240 amp	36 V - 320 amp	36 V - 320 amp
Lifting with rated load	24 V - 36 V - 415 amp	36 V - 570 amp	36 V - 570 amp

Ordering Spare Parts

1. Locate fault on truck.
2. Identify truck model, serial number, and battery voltage.
3. Locate page with the exploded diagram and find the item number for the part required.
4. Locate item number in table. Select the column for actual truck model and serial number. The following is an explanation of a serial number:



* 30=3000, 35=3500, 45=4500, 40=4000, 50=5000
** ND, NR, NS

> ⚠ **CAUTION** Although some trucks appear to be similar, component parts may not be interchangeable. If an incorrect part is used, the truck may malfunction.

5. Note part number.
6. Call your local **Komatsu Forklift Dealer** and state the part number.
7. If truck model, serial number, or article number cannot be found, call your local **Komatsu Forklift Dealer** for assistance.